Science Classroom Safety

Safety awareness begins with regulations and guidelines that are set by school boards and enforced by principals. Detailed safety practices should be established and supervised by the designated department head.

As the teacher, however, you have the ultimate responsibility of enforcing safety practices in your classroom. Be sure to set an example in the laboratory by observing all basic rules at all times. Always wear protective clothing and eyewear, and dispose of chemicals and other materials properly. Maintain high standards of cleanliness and organization in the science area.

Planning is essential to laboratory safety and success. That planning must include consideration for accident prevention and a review of emergency procedures. The activities in the *Science Links 9* program are designed to minimize dangers in the laboratory. Even so, there are no guarantees against accidents. Careful planning and preparation, as well as being aware of hazards, will help keep accidents to a minimum.

Information on laboratory safety is available from a variety of sources and includes detailed instructions on planning safe procedures and preventing accidents. Much of this information can be summarized in the phrase "Be prepared!" Know the rules and what common violations occur. Know your students and their abilities to follow instructions and evaluate potential hazards. Know where emergency equipment is stored and how to use it. Good laboratory housekeeping and management begin with observing your local regulations and the following guidelines:

In the Classroom/Science Laboratory

Follow your provincial science organization's recommendations as well as local board regulations. Consider the following as you set up your science supplies:

1. Store chemicals properly.
   - Separate chemicals by anion. Keep oxidizers (for example, nitrate, chlorate) separate from reducers (metals, organics, sulfur).
   - Label all chemical containers with WHMIS labels, special precautions, and the expiration date.
   - Discard outdated chemicals according to appropriate disposal methods.
   - Do not store chemicals above eye level.
   - Use wood shelving rather than metal. All shelving should be firmly attached to walls. Anti-roll lips should be placed on all shelves.
   - Store only those chemicals that you plan to use. Do not stockpile chemicals.
   - Keep flammable and toxic chemicals in special storage containers. Do not store more than 500 mL of flammable liquids in the laboratory at one time.
   - Ensure that you do not have chemicals that have been banned by your school board.
2. Store equipment properly.
   - Clean and dry all equipment before storing it.
   - Protect electronic equipment and microscopes from dust, humidity, and extreme temperatures.
   - Label and organize equipment so that it is easily accessible.
3. Provide adequate workspace for students to do investigations.
4. Provide adequate room ventilation.
5. Review safety and evacuation guidelines at the beginning of each term and from time to time throughout the term. Ensure that students with language difficulties have understood the information. Post the guidelines in a prominent place in the classroom.
6. Ensure that safety equipment is accessible and working properly. Ideally, safety equipment should include at least fire extinguishers, fire blankets, and eyewash stations.
7. Provide containers for the disposal of chemicals, waste products, and biological specimens. Disposal methods must meet local guidelines.
8. Take special care when carrying out any activities that require a heat source.
   - Use hot plates instead of laboratory burners as much as possible for activities requiring a heat source.
   - Ensure that the room has an adequate number of electrical outlets, and use only approved extension cords.
   - Use a central shut-off valve for the gas supply, accessible only to you, if laboratory burners are used.
   - Never use open flames when a flammable solvent is in the same room. Thus, alcohol burners should not be used; alcohol in the presence of fire is a potentially dangerous situation.
   - Use hot water from the tap to make a hot-water bath as an alternative to using a hot plate or laboratory burner. Warn students that water from the tap can be hot enough to cause burns.

First Day of Class/Labs

1. With students, discuss the safety rules on pages xii–xv of *Science Links 9*. Also discuss the *Science Links 9* Safety Symbols and WHMIS symbols shown on page xv of the student textbook. See Building Scientific Literacy Notes on page TR-19 of this Teacher's Resource for teaching strategies.
2. Review the safe use of equipment, chemicals, and biological specimens with students.
3. Review the use and location of safety equipment and evacuation guidelines with students.
4. Discuss safe disposal of materials and laboratory clean-up policy.
5. Discuss the proper attitude for working in the laboratory.
6. Document students' understanding of the above points.
   - Have students sign a safety contract (**BLM G-1 Safety Contract**) and return it to you.
   - Prepare and have students write a safety quiz. (**BLM G-2 WHMIS Symbols and Hazardous Household Product Symbols**, provides a review and quiz on WHMIS symbols.)
   - Reinforce the meanings of WHMIS Symbols by playing a game using **BLM G-3 WHMIS Symbol Cards**.
7. Review safety practices with students often during the school year.

Before Each Activity

1. Perform each activity yourself before assigning it to students in order to determine where students may have trouble.
2. Arrange the laboratory in such a way that apparatus and materials are easily accessible and supplies are clearly labelled. Avoid confusion in the area where materials are dispensed.
3. Prepare only the apparatus and materials needed to complete the assigned activity. This practice helps cut down or eliminate the problem of students doing unauthorized experiments.
4. Review the procedure with students. Emphasize caution within the procedure.
5. Be sure all students know the proper procedures to follow if an accident should occur.

During Each Activity

1. Make sure the laboratory is clean and free of clutter.
2. Insist that students wear safety goggles and lab coats when indicated.
3. Never allow students to work alone.
4. Never allow students to use a cutting device with more than one edge.
5. Be sure to shield systems that are under pressure or a vacuum. Use extreme caution if you use a pressure cooker for sterilization purposes. Turn off the heat source and allow pressure to return to normal before opening the cover.
6. Students should not point the open end of a heated test tube toward themselves or other students.
7. Remove broken or chipped glassware from use immediately. Clean up any spills immediately. Dilute spilled solutions with water before cleaning them up.
8. Be sure all glassware that is to be heated is of a heat-treated type that will not shatter. Discard all other glassware.
9. Remind students that heated objects may look the same as objects at room temperature.
10. Prohibit eating and drinking in the laboratory.

After Each Activity

1. Be sure that the laboratory is clean, including all work surfaces and equipment.
2. Be certain that students have disposed of any broken glassware and chemicals properly.
3. Be sure any hot plates and burners have been turned off.
4. Insist that students wash their hands when the laboratory work is completed.